

CBL BIOLOGY: LIFE SCIENCE OPTION

BSCS Green Version 10th edition

Biology An Ecological Approach

Lesson Plan Quarter 2, Week 7, Day 1



Outcomes for Today

Standards Focus: 1dh 2acefg 3abc 4abcef 5abcde 7bc

PREPARE

1. Background knowledge necessary for today's reading.

A good way to build interest in this section is the idea of paternity. In other words, "Whose child is it?" Of course, this will build interest. Checking for prior learning, engage the class in a little discussion by posing such questions as:

Who determines the sex of a child, the mother or father?

Talk a little about good old Henry VIII and what happened in history.

Perhaps some of your students have their own stories.

Another question has to do with male baldness, another x-linked trait.

2. Vocabulary Word Wall.

Introduce five important, useful words from today's reading.

karyotype

autosomes

mutation

x-linked trait

hemophilia

•Show, say, explain, expand, explode or buzz about the word briefly.

•Show, say and define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

Start at the beginning and review the concepts and vocabulary covered so far.

•Mention the setting and main ideas.

•Point to the concept chart as you quickly review it.

This is a good time to stop and regroup, reviewing some key concepts including the following:

Heredity is the transmission of genetic information from generation to generation.

Genes determine the physical (phenotype) characteristics of an organism.

Gregor Mendel has been called the father of modern genetics because of his extensive work with peas, in which he identified key genetic principles.

Crossing pure genetic strains can produce hybrid strains of an organism.

Dominant genetic characteristics prevail in cross-fertilization.

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4. Read directions for investigation/activity.

5. Read text. Ch 8, Heredity and Genetic Variation, pp. 202-204 (Section 8.6)

- Shared Reading RRP: Read, React, Predict every 2-3 pages
 Tape Partner Choral Silent Round Robin Reading

| Setting | Characters | Pages |
|----------------------|---|----------------|
| human fruit flies | chromosomes characteristics such as white eyes, curly wings, etc. | 202-203 203 |

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events to the billboard.

- Discuss the text. Clarify the most important facts, concepts, ideas and vocabulary.
- Decide on the 3-5 most important **concepts** and post these on the billboard.

Students might mention:

Biologists can identify chromosomes as viewed through a microscope after they are stained. Each one has a distinctive shape and they can be counted as well. When the chromosomes separate during meiosis, there are two similar sex chromosomes in females but two different ones in males. These different chromosomes are known as x and y chromosomes.

Thomas Hunt Morgan was a scientist who studied fruit flies like Mendel studied peas.

Some characteristics of the organism are associated with the sex chromosomes and are known as x-linked traits.

7. Post information on the billboard. Add new information to ongoing class projects on the wall.

- New concept information can be added to the billboard.
- An answer can be added to a question from the KWL Chart.
- New information can be added to ongoing charts and investigations.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity:

X-Linked Traits - A Little Research Project

Introduction

More than 200 x-linked traits have been identified in humans. Some are connected with disorders such as hemophilia, red-green color blindness, and a type of muscular dystrophy. By far the most common of these is the red-green color blindness disorder.

Activity

Go to this web link and read about color blindness. Print the color blindness test sheets. Have students perform the simple test on each other. As an extension, they could administer the test on related family members. Once this is done, students could construct a family tree diagram and draw conclusions about the genetic trail.

<http://www.toledo-bend.com/colorblind/lshihara.html>

For further information on red-green color blindness, go to this web site.

http://en.wikipedia.org/wiki/Color_blindness

Student work could be posted on the wall.

Other possible activities for a class group or individual

- Bookmark Open Mind Portrait g6 Graphic Organizer
 g7 Main Idea Graphic Organizer c1-12 Cubing Postcard Prop
 Poster Ad Map Retelling Reader's Theatre Cartoon Rap

Key Questions

1. What are autosomes?
2. Why do you suppose biologist have studied fruit flies to discover genetic patterns?
3. What is a mutation? Give some examples.
4. What kinds of things in the environment might cause mutations?

Remember to ask literal structural idea craft author literature life evaluate and inference questions every day.

Key Paragraph

Remember that genes are integral parts of chromosomes, which occur in matching pairs. When chromosomes are stained, the stains concentrate in specific regions and thus create a characteristic banding pattern. The two chromosomes in each pair show the same banding pattern, and their pattern is different from the patterns of other chromosome pairs. Once the chromosomes are stained, they can be photographed through a microscope.

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EXTEND

11. Prompt every student to write a short product tied to today's reading

Introduce and/or review the history of the famous Henry VIII, King of England. Share the lyrics below with the students. Ask them to write a short paragraph explaining the meaning of the words based upon their understanding of genetics and x and y chromosomes.

I'M HENRY THE VIII, I AM

(Murray/Weston)

I'm Henry the eighth I am
 Henry the eighth I am, I am
 I got married to the widow next door
 She's been married seven times before
 And every one was an Henry (Henry)
 She wouldn't have a Willy or a Sam (no Sam)
 I'm her eighth old man, I'm Henry
 Henry the eighth I am

Second verse same as the first

I'm Henry the eighth I am
 Henry the eighth I am, I am
 I got married to the widow next door
 She's been married seven times before
 And every one was an Henry (Henry)
 She wouldn't have a Willy or a Sam (no Sam)
 I'm her eighth old man, I'm Henry

Henry the eighth I am

----- lead guitar -----

I'm Henry the eighth I am
 Henry the eighth I am, I am
 I got married to the widow next door
 She's been married seven times before
 And every one was an Henry (Henry)
 She wouldn't have a Willy or a Sam (no Sam)
 I'm her eighth old man, I'm Henry
 Henry the eighth I am

H-E-N-R-Y

Henry (Henry)
 Henry (Henry)
 Henry the eighth I am, I am
 Henry the eighth I am

Yeah!

12. Close with a short summary.

Extend the reading to the students' lives or to the world.

CBL BIOLOGY: LIFE SCIENCE OPTION

BSCS Green Version 10th edition

Biology An Ecological Approach

Lesson Plan Quarter 2, Week 7, Day 2



Outcomes for Today

Standards Focus: 1dh 2acefg 3abc 4abcef 5abcde 7bc

PREPARE

1. Background knowledge necessary for today's reading.

In this section, students will be introduced to the concept of what abnormal chromosomes can mean for the developing human organism. This will be a good opportunity to lay the factual groundwork for such conditions as Down's syndrome.

Consider this statement: "I have yet to see Down's syndrome walk through the door." It is important to distinguish between labels and the real person. After some checking for understanding with the class, you may want to consider probing a bit to talk about attitudes towards people with developmental disabilities. After all, we are talking about character education here.

2. Vocabulary Word Wall.

Introduce five important, useful words from today's reading.

abnormality Down's syndrome trisomy nondisjunction
spontaneous abortion

- Show, say, explain, expand, explode or buzz about the word briefly.
- Show, say and define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

Start at the beginning and review the concepts and vocabulary covered so far.

- Mention the setting and main ideas.
 - Point to the concept chart as you quickly review it.
- Chromosomes pair up, duplicate, and divide during meiosis.
 This process occurs in the development of sex cells (eggs and sperm).
 The male sex cell is different from the female as there are two types of male sex cells.
 The male sex cell determines the sex of the new organism (male or female).
 Some genetic traits are linked to the male sex cells only.

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4. Read directions for investigation/activity.

5. Read text. Ch 8, Heredity and Genetic Variation, pp. 204-206 (Section 8.7)

- Shared Reading RRP: Read, React, Predict every 2-3 pages
 Tape Partner Choral Silent Round Robin Reading

| Setting | Characters | Pages |
|------------------|---------------------------------|-------|
| human population | individual with Down's syndrome | 204 |
| Great Britain | Geneticist Mary Lyon | 205 |

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events to the billboard.

- Discuss the text. Clarify the most important facts, concepts, ideas and vocabulary.
- Decide on the 3-5 most important **concepts** and post these on the billboard.

Students might mention:

Abnormal numbers of chromosomes can cause problems in the development of humans.

Down's syndrome is a condition in which a human has a small extra chromosome. This results in an individual with a "different looking" set of facial features such as eye appearance.

Individuals with Down's syndrome also have developmental challenges.

There are other "syndromes" that result from chromosome abnormalities. These include: Turner's Syndrome and Klinefelter's Syndrome.

In a spontaneous abortion, the body of the mother rejects the fetus due to abnormalities in the developing fetus.

7. Post information on the billboard. Add new information to ongoing class projects on the wall.

- New concept information can be added to the billboard.
- An answer can be added to a question from the KWL Chart.
- New information can be added to ongoing charts and investigations.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity:

The Human Face of Down's Syndrome

Introduction

After an introduction to Down's syndrome, many students will be compelled to learn more. Often they would like to help or assist others with this condition. This is particularly true of so called at-risk students. Students with Down's syndrome or related developmental challenges, are not prone to peer pressure issues and so good relationships can be forged between your students and special needs students.

Here are some possibilities:

- Is there a special education class at or near your classroom setting that serves students with Down's syndrome? If so, you may want to reach out and set up a support or tutoring project.
- What about Special Olympics or another activity in which your students could assist?
- Many times special needs students need assistance with simple activities such as outings or “mini field trips” to a local bowling alley or other venue.

All of these provide possibilities for breaking down barriers and putting a face on the “syndrome.”

For more information:

National Down's Syndrome Society

http://www.ndss.org/index.php?option=com_content&task=category§ionid=34&id=142&Itemid=198

Alternative Activity

I am Sam with Sean Penn

In this movie, a developmentally disabled adult (Sean Penn) is cast in the role of a father trying to raise his daughter. It puts a human face on the syndrome.

More information is available at:

http://en.wikipedia.org/wiki/I_Am_Sam

Other possible activities for a class group or individual

Bookmark Open Mind Portrait g6 Graphic Organizer

g7 Main Idea Graphic Organizer c1-12 Cubing Postcard Prop

Poster Ad Map Retelling Reader's Theatre Cartoon Rap

Key Questions

1. Describe some of the physical characteristics of a person with Down's syndrome.
2. What is the genetic cause of Down's syndrome?
3. Explain nondisjunction?
4. What is a spontaneous abortion and why do they generally happen?
5. What can be said about chromosomes and normal development?

Remember to ask literal structural idea craft author literature life evaluate and inference questions every day.

Key Paragraph

Some types of developmental errors are caused by abnormal numbers or types of chromosomes. These chromosomal abnormalities originate at the moment of fertilization, and their effects may be apparent at birth. One such condition is Down's syndrome. Individuals with this condition have distinctive features of the eyes, mouth, hands, and sometimes internal organs. All have retarded mental development, though the degree of delayed development varies greatly.

EXTEND

11. Prompt every student to write a short product tied to today's reading

Here is a possible writing prompt:

You have learned a little more about Down's syndrome as well as the human side of this condition. How has your attitude towards people with this condition changed? Why is this so? Write a short paragraph explaining your perspective.

12. Close with a short summary.

Extend the reading to the students' lives or to the world.

CBL BIOLOGY: LIFE SCIENCE OPTION

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Biology An Ecological Approach

Lesson Plan Quarter 2, Week 7, Day 3



Outcomes for Today

Standards Focus: 1dh 2acefg 3abc 4abcef 5abcde 7bc

PREPARE

1. Background knowledge necessary for today's reading.

We now return to DNA and how it was first identified. There has been much in the news with regard to DNA as part of a crime-solving process, as well as identification of individuals by making use of very small parts of remaining human tissue. Explain to students that these are recent developments. Before DNA could be used to solve such puzzles, it had to be isolated and identified as the source of genetic blueprinting. This lesson is about the scientific discovery process of DNA. One final point is the independent discovery process. Try to explain how similar conclusions achieved through different independent experimental processes make compelling evidence for developing theories such as the chromosome theory.

2. Vocabulary Word Wall.

Introduce five important, useful words from today's reading.

genes

nucleus

fruit fly

DNA

RNA

- Show, say, explain, expand, explode or buzz about the word briefly.
- Show, say and define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

Start at the beginning and review the concepts and vocabulary covered so far.

- Mention the setting and main ideas.
- Point to the concept chart as you quickly review it.

Before genes were "discovered," Gregor Mendel described principles of heredity. The sex cells or gametes each contribute an equal amount of genetic material to the new organism.

The nucleus of the cell is where chromosomes are found.

Chromosomes contain genetic material.

Chromosomes duplicate and divide before the cell divides.

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4. Read directions for investigation/activity.

5. Read text. Ch 8, Heredity and Genetic Variation, pp. 207-207 (Section 8.8)

- Shared Reading RRP: Read, React, Predict every 2-3 pages
 Tape Partner Choral Silent Round Robin Reading

| Setting | Characters | Pages |
|-------------|-----------------|-------|
| nucleus | chromosomes | 207 |
| chromosomes | DNA and protein | 207 |
| virus | protein coat | 207 |

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events to the billboard.

- Discuss the text. Clarify the most important facts, concepts, ideas and vocabulary.
- Decide on the 3-5 most important **concepts** and post these on the billboard.

Students might mention:

Scientists found physical evidence of genes before they really knew what they (the genes) were.

The fruit fly was used a great deal in experiments about genetics.

Scientists wanted to find out if it was the DNA or the protein in the nucleus that contained the genes.

Several scientists developed experiments in which a radioactive substance was used as a tracer to see which of these two substances (proteins or DNA) contained the genes.

Several groups of scientists found out independently of one another that the genes were in the DNA.

7. Post information on the billboard. Add new information to ongoing class projects on the wall.

- New concept information can be added to the billboard.
- An answer can be added to a question from the KWL Chart.
- New information can be added to ongoing charts and investigations.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity:

Lorenzo's Oil

This movie is a good introduction to a genetic disease as well as a good review of the scientific method.

Here is a brief synopsis:

This is the almost true story of Lorenzo Odone, his parents, and their fight against a terrible disease, adrenoleukodystrophy (ALD). The tale begins in 1984 when Lorenzo, then age 5, is diagnosed with the disease. The doctors give him a prognosis of relentlessly increasing disability and death within two years. There is no treatment. The Odones do not accept this verdict and embark on a dramatic search for a way to save their son.

If you would like a lesson plan with good additional resources go to:
<http://www.teachwithmovies.org/index.html>

Note: For a small fee, you can join **Teach With Movies**. It is a very good resource for using appropriate movies as supplemental resources.

Other possible activities for a class group or individual
Bookmark Open Mind Portrait g6 Graphic Organizer
g7 Main Idea Graphic Organizer c1-12 Cubing Postcard Prop
Poster Ad Map Retelling Reader's Theatre Cartoon Rap

Key Questions

1. What was some of the physical evidence biologists found for genes?
2. Early biologists believed that genes were located in the _____ of each cell.
3. What small animal was used extensively for genetic studies? Why?
4. What is an independent conclusion?
5. How did scientists figure out that sperm and egg each contribute the same amount of genetic material to the new organism?

Remember to ask literal structural idea craft author literature life
evaluate and inference questions every day.

Key Paragraph

Early in the 20th century, biologists found physical evidence of genes-Mendel's factors. By 1902, the connection between the activity of chromosomes during meiosis and fertilization and the transmission of hereditary information by genes was clear.

Experiments with ova and sperm cells showed that the gametes provide equal numbers of genes to a new organism.

EXTEND

11. Prompt every student to write a short product tied to today's reading

Here is a good prompt to get students to begin thinking about genetic counseling:

What possible genetic defects are in your family history that you believe could be passed down to a child? Knowing this, how would your knowledge of genetics help with your decision to have children? Write a short paragraph about what you think about when posed with this question.

12. Close with a short summary.

Extend the reading to the students' lives or to the world.

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Biology An Ecological Approach
Lesson Plan Quarter 2, Week 7, Day 4



Outcomes for Today

Standards Focus: 1dh 2acefg 3abc 4abcef 5abcde 7bc

PREPARE

1. Background knowledge necessary for today's reading.

These two sections (8.9 and 8.10) are about how DNA replicates and the locations of genes on chromosomes. DNA is often called a “blueprint” for life. What is a blueprint? You might consider bringing in some sort of plans, such as building construction or house plans, to show students. Once they understand the idea of a blueprint, the next step is to move into the complex process of DNA replication.

2. Vocabulary Word Wall.

Introduce five important, useful words from today's reading.

nucleotides complimentary recombination linkage genetic mapping

- Show, say, explain, expand, explode or buzz about the word briefly.
- Show, say and define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

Start at the beginning and review the concepts and vocabulary covered so far.

- Mention the setting and main ideas.
 - Point to the concept chart as you quickly review it.
- Genetic material is located in the nucleus of each cell.
 Genes are responsible for the numerous traits in organisms.
 The specific location of this genetic material is on the chromosomes.
 Genes are located in the chromosomes and DNA is what makes up the genes.

4. Read directions for investigation/activity.

5. Read text. Ch 8, Heredity and Genetic Variation, pp. 208-210 (Section 8.9 and 8.10)

- Shared Reading RRP: Read, React, Predict every 2-3 pages
 Tape Partner Choral Silent Round Robin Reading

| Setting | Characters | Pages |
|----------------------------------|-------------------------------------|-------|
| DNA molecule human chromosome | adenine, thymine, guanine, cytosine | 209 |
| | blood group oncogenes, enzymes | 210 |

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events to the billboard.

- Discuss the text. Clarify the most important facts, concepts, ideas and vocabulary.
- Decide on the 3-5 most important **concepts** and post these on the billboard.

Students might mention:

Watson and Crick figured out the structure of DNA.

DNA is a long and twisted molecule. It can easily come apart like a zipper.

Once the "zipper" comes apart, the open ends will attract and connect with new particles to form two identical DNA molecules.

Each chromosome has many genes.

Genes that are located close to one another on a chromosome are said to be linked.

Biologists have mapped where the genes are located on the chromosomes.

7. Post information on the billboard. Add new information to ongoing class projects on the wall.

- New concept information can be added to the billboard.
- An answer can be added to a question from the KWL Chart.
- New information can be added to ongoing charts and investigations.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

One possible activity:

Candy DNA Model

This activity will take two days (periods). See supplemental investigation at the end of this lesson for directions.

Another possible activity:

Simulated DNA Replication

Here is an alternative activity in which students learn to match the genetic code of DNA.

Introduction

The DNA code is carried to the ribosome by messenger RNA; the code shown is the DNA code; you are to change the code to the m-RNA and determine the letter of the sequence. The items must be listed in the order the code dictates.

Example: In this DNA sequence:

DNA = CCC ATG TTC CGT CTG TCC TTC

The messenger RNA would equal:

mRNA GGG UAC AAG GCA GAC AGG AAG

Have students determine the mRNA for each example:

Example 1

CCCTCCAAAAGGATGTTTGTAGCCGAAGGAAACCATTC

Example 2

CCCAGTTTCAGGGAGTTTAGGTAGCGCAGTGTTTTCCATTTCCGAGCCGT
CCAGTTTTCCGCCTGCGC

Example 3

CCCAGTCTGTCCCCAGACAGGTTCAAACGTCTGTAGAAAGCG

Example 4

CCCAGTTTCCGTCGTAGC

Example 5

CCCAGTAGGTTTCCATTCCTGCGT

Example 6

CCCAAAGCGTCCAAACGT

Example 7

CCCAGGGACATGATGTTTCAGGATGAAACGTCTGA

Example 8

CCCAGTCTGTCCCCAGACAGGTTTCAGTGCGAAACGTCCA

Example 9

CCCTCCAAAAGGCGAATGTTTAAAAGGCGA

Example 10

CCCCTAAGGAAACGCCGC

Example 11

CCCAGGTTTTCTTA

Example 12

CCCGTCTTCTTCCGA

Example 13

CCCTAGAAATTATTCGCGCTGCGCCCACTGCCATTCTAGCGCCTGCGTTTT
AGGCGATTCAGG

Other possible activities for a class group or individual

- Bookmark Open Mind Portrait g6 Graphic Organizer
 g7 Main Idea Graphic Organizer c1-12 Cubing Postcard Prop
 Poster Ad Map Retelling Reader's Theatre Cartoon Rap

Key Questions

1. Use your knowledge to make an illustration of a DNA molecule.
2. Create another illustration of DNA "unzipping."
3. Draw a picture of a set of chromosomes with linked genes.
4. What is a genetic map?
5. What is meant by the phrase, "Genes are linked"?
6. What is recombination?

Remember to ask literal structural idea craft author literature life
 evaluate and inference questions every day.

Key Paragraph

Once it was known that genes are composed of DNA as well as a code for specific proteins, molecular biologists could begin to answer specific questions about the chemical basis of genetics. What was the molecular structure of genes? How do they coordinate their dual role of transmitting information to the next generation and programming the structure and function of the organism? What is the role of RNA, the other nucleic acid?

EXTEND**11.** Prompt every student to write a short product tied to today's reading

What could happen if DNA replication does not go well?
Have students write a paragraph explaining what will happen if the DNA message is wrong during the process.

12. Close with a short summary.

Extend the reading to the students' lives or to the world.



Supplemental Student Investigation CANDY DNA AND REPLICATION

Objective:

Students will show how the basic structure of DNA is important in the process of DNA replication.

Materials (per class of 30):

Twizzlers candy or other similar licorice stick candy:

red, three large packages, each length of candy cut into four pieces

black, two large packages, each length of candy cut into six pieces

(Note: 24 pieces of each color are needed per student group; although you will be able to handle more student groups with less candy if the pieces are smaller; beware of cutting them too small to accept the toothpicks; cut so that the red and the black pieces are different sizes to allow for easier identification by students.)

An alternative available in some locales is the candy sold in small pieces, usually called "Bits" or something like that.

Colored marshmallows or gumdrops OR any small, soft candy available in four colors. (You will need the four colors to show replication.) Make sure that the candy is large enough to accept the toothpicks.

(Note: You will need 24 pieces of candy [six of each of the four colors] for each student group.)

Plain wooden toothpicks, two boxes of 500, broken into halves (just a few of the second box need to be prepared for a class of 30).

Procedure:

Note: Be sure that working surfaces and hands have been cleaned before starting this activity, if you intend to consume your models after finishing.

1. Assign one nitrogen base to each of the four colors. For example: green = adenine, blue = thymine, red = cytosine, yellow = guanine.
2. Distribute 24 pieces each of red and black Twizzlers, assorted colors of marshmallows, and 72 toothpick halves to each team. (Note to teacher: There should be equal numbers of each color of marshmallows to insure that each base will be able to match with its complementary base. It may be convenient to provide six marshmallows in random colors at first, and then to allow students to get the necessary color matches to make the complementary strand.)

3. Prepare six individual nucleotides: Use toothpicks to connect one black to one red Twizzler piece. Then add one marshmallow perpendicularly to the black candy. (Note to students: What DNA component is represented by the black Twizzler piece? by the red Twizzler piece? by the marshmallow?)
4. Assemble nucleotides into a polynucleotide strand by connecting the red piece of one nucleotide to the black of another. Continue until a strand of six nucleotides has been constructed. (Note to teacher: It may be useful to have students draw a DNA molecule that can then be used as a model for this construction.) Once this is completed, all of the reds and blacks should be in alternation in a straight line; the marshmallows should be sticking out at a perpendicular angle from the blacks.
5. Assemble a strand which is complementary to the strand which you have already built. Place the second strand next to the first so that the "bases" touch.
6. To demonstrate replication, first make 12 more nucleotides with the same nitrogen bases as the first two strands.
7. "Unzip" the DNA double strand. Assemble the proper nucleotides, one by one, showing the 5'-3' order for each strand: One side should be assembled in order, the other should be assembled showing the "lag" and formation of Okazaki fragments.
8. After you demonstrate this to your teacher, you may dispose of your models. This is one case where you may eat your science project, if you have kept everything clean and your teacher gives permission. Be sure to remove toothpicks before you eat!!! Clean up, being sure that no toothpicks or sticky residue are left behind. Wash your hands!

CBL BIOLOGY: LIFE SCIENCE OPTION

BSCS Green Version 10th edition

Biology An Ecological Approach

Lesson Plan Quarter 2, Week 7, Day 5



Outcomes for Today

Standards Focus: 1dh 2acefg 3abc 4abcef 5abcde 7bc

PREPARE

1. Background knowledge necessary for today's reading.

This is a reading which gets back to the scientific method and how biologists continue to use this method to discover new principles. In essence, they are creating new knowledge. This might be a good time to talk about the concept of new knowledge and how it is developed. It might also be a very good time to revisit the scientific method.

2. Vocabulary Word Wall.

Introduce five important, useful words from today's reading.

pink bread mold asexual mutation heritable change enzyme

- Show, say, explain, expand, explode or buzz about the word briefly.
- Show, say and define the word quickly and add to the word wall.

READ

3. Review the vocabulary and concepts previously covered in this chapter.

Start at the beginning and review the concepts and vocabulary covered so far.

- Mention the setting and main ideas.
- Point to the concept chart as you quickly review it.

Organisms pass traits on to new organisms. This is heredity.

Many studies on heredity by scientists have involved careful observation and experimentation with both simple and complex organisms such as peas.

As new knowledge was developed, scientists found that certain chemicals are responsible for the transmission of genetic characteristics.

DNA is the complex molecule that is responsible for the genetic code.

RNA transmits this code.

4. Read directions for investigation/activity.

5. Read text. Ch 8, Heredity and Genetic Variation, pp. 210-211 (Section 8.11)

- Shared Reading RRP: Read, React, Predict every 2-3 pages
 Tape Partner Choral Silent Round Robin Reading

| Setting | Characters | Pages |
|----------------|-----------------|---------|
| the laboratory | pink bread mold | 210-211 |

RESPOND

6. Fix the facts. Clarify what's important.

Discuss the reading and add 3-5 events to the billboard.

- Discuss the text. Clarify the most important facts, concepts, ideas and vocabulary.
- Decide on the 3-5 most important **concepts** and post these on the billboard.

Students might mention:

Scientists can discover scientific principles of heredity by studying very simple life forms, like mold.
 X-rays can be used to create mutations (changes) in organisms.
 This is why they cover us when we are x-rayed in the dentist's office.
 Mutations can be inherited.
 A nutritional deficiency is a condition in which an organism cannot make use of some food sources.

7. Post information on the billboard. Add new information to ongoing class projects on the wall.

- New concept information can be added to the billboard.
- An answer can be added to a question from the KWL Chart.
- New information can be added to ongoing charts and investigations.

EXPLORE

8. Explore today's investigation with inquiry activities.

9. Explore today's simulation with inquiry activities.

10. Collect data and post.

Two possible activities:

DNA Molecule Model

As mentioned in the previous lesson, this is a two day activity. See the supplemental lesson plan attached to Week 7, Day 4 (the previous lesson).

DNA Model and Review

See supplemental investigation attached to this lesson plan.

Other possible activities for a class group or individual

- Bookmark Open Mind Portrait g6 Graphic Organizer
 g7 Main Idea Graphic Organizer c1-12 Cubing Postcard Prop
 Poster Ad Map Retelling Reader's Theatre Cartoon Rap

Key Questions

Refer to the questions at the end of the supplemental investigation, **DNA - The Double Helix**, attached to this lesson plan.

Remember to ask literal structural idea craft author literature life
 evaluate and inference questions every day.

Key Paragraph

Our understanding of the chemical basis of heredity has come primarily from studies of organisms less complex than garden peas. A giant step toward understanding how genes function came from studying a pink bread mold called *Neurospora crassa*. *Neurospora crassa* reproduces both asexually by means of spores and sexually.

EXTEND

11. Prompt every student to write a short product tied to today's reading

Create a Chromosome

Have students look at Figure 8.21 in the text. Have them create an illustration of one of their chromosomes and indicate a number of personal traits on their diagram. Ask them to write a short paragraph explaining their drawing for the non-scientific mind!

12. Close with a short summary.

Extend the reading to the students' lives or to the world.



Supplemental Student Investigation DNA - The Double Helix

Objective: To review and understand the structure of DNA

Review:

Recall that the nucleus is a small, spherical, dense, body in a cell. It is often called the "control center" because it controls all the activities of the cell including cell reproduction and heredity. Chromosomes are microscopic threadlike strands composed of the chemical DNA (short for deoxyribonucleic acid). In simple terms, DNA controls the production of proteins within the cell. These proteins in turn, form the structural units of cells and control all chemical processes within the cell. Think of proteins as the building blocks for an organism. Proteins make up your skin, your hair, parts of individual cells. How you look is largely determined by the proteins that are made. The proteins that are made are determined by the sequence of DNA in the nucleus.



Chromosomes are composed of genes. A gene is a segment of DNA that codes for a particular protein which in turn codes for a trait. Hence you hear it commonly referred to as the gene for baldness or the gene for blue eyes. Meanwhile, DNA is the chemical that genes and chromosomes are made of. DNA is called a nucleic acid because it was first found in the nucleus. We now know that DNA is also found in organelles, the mitochondria and chloroplasts, though it is the DNA in the nucleus that actually controls the cell's workings.

In 1953, James Watson and Francis Crick established the structure of DNA. The shape of DNA is a double helix (**color the title black**), which is like a twisted ladder. The sides of the ladder are made of alternating sugar and phosphate molecules. The sugar is deoxyribose. **Color all the phosphates pink (one is labeled with a "P")**. **Color all the deoxyriboses blue (one is labeled with a "D")**.

The rungs of the ladder are pairs of four types of nitrogen bases. The bases are known by their coded letters A, G, T, C. These bases always bond in a certain way. Adenine will bond only to thymine. Guanine will bond only with cytosine. This is known as the "Base-Pair Rule." The bases can occur in any order along a strand of DNA. The order of these bases is the code that contains the instructions. For instance, ATGCACATA would code for a different gene than AATTACGGA. A strand of DNA contains millions of bases (for simplicity, the image only contains a few).

Color the thymines orange. 

Color the adenines green. 

Color the guanines purple. 
 Color the cytosines yellow. 

Note that that the bases attach to the sides of the ladder at the sugars and not the phosphates.

The DNA helix is actually made of repeating units called nucleotides. Each nucleotide consists of three molecules: a sugar (deoxyribose), a phosphate which links the sugars together, and then one of the four bases. Two of the bases are purines - adenine and guanine. The pyrimidines are thymine and cytosine. Note that the pyrimidines are single ringed and the purines are double ringed. Color the nucleotides using the same colors with which you colored them in the double helix.

The two sides of the DNA ladder are held together loosely by hydrogen bonds. The DNA can actually "unzip" when it needs to replicate - or make a copy of itself. DNA needs to copy itself when a cell divides, so that the new cells each contain a copy of the DNA. Without these instructions, the new cells wouldn't have the correct information. The hydrogen bonds are represented by small circles. **Color the hydrogen bonds gray.**

Messenger RNA

So, now, we know the nucleus controls the cell's activities through the chemical DNA, but how? It is the sequence of bases that determine which protein is to be made. The sequence is like a code that we can now interpret. The sequence determines which proteins are made and the proteins determine which activities will be performed. And that is how the nucleus is the control center of the cell. The only problem is that the DNA is too big to go through the nuclear pores. So a chemical is used to read the DNA in the nucleus. That chemical is messenger RNA. The messenger RNA (mRNA) is small enough to go through the nuclear pores. It takes the "message" of the DNA to the ribosomes and "tells them" what proteins are to be made. Recall that proteins are the body's building blocks. Imagine that the code taken to the ribosomes is telling the ribosome what is needed - like a recipe.

Messenger RNA is similar to DNA, except that it is a single strand, and it has no thymine. Instead of thymine, mRNA contains the base uracil. In addition to that difference, mRNA has the sugar ribose instead of deoxyribose. RNA stands for **Ribonucleic Acid**. Color the mRNA as you did the DNA, except:

Color the ribose a DARKER BLUE, and the uracil brown. 

The Blueprint of Life

Every cell in your body has the same "blueprint" or the same DNA. Just as the blueprints of a house tell the builders how to construct the house, the DNA "blueprint" tells the cell how to build the organism. Yet, how can a heart be so different from a brain if all the cells contain the same instructions? Although much work remains in genetics, it has become apparent that a cell has the ability to turn off most genes and work only with the genes necessary to do a job. We also know that a lot of DNA apparently is nonsense and codes for nothing. These regions of DNA that do not code for proteins are called "introns," or sometimes "junk DNA." The sections of DNA that do actually code from proteins are called "exons."

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Name _____

1. Write out the full name for DNA. _____
2. What is a gene? _____
3. Where in the cell are chromosomes located?

4. DNA can be found in what two organelles?

5. What two scientists established the structure of DNA?

6. What is the shape of DNA? _____
7. What are the sides of the DNA ladder made of?

8. What are the "rungs" of the DNA ladder made of?

9. What sugar is found in DNA? _____ In RNA?

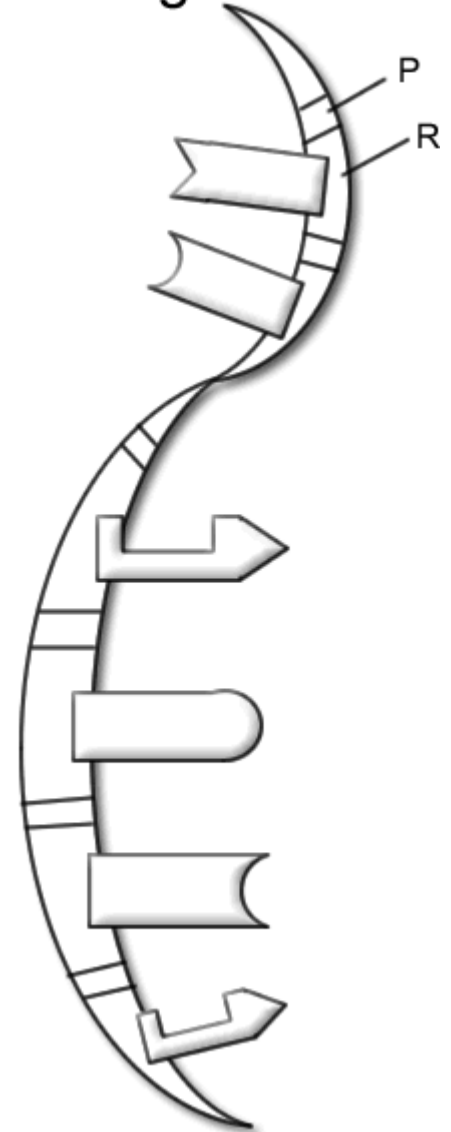
10. How do the bases bond together? A bonds with _____ G bonds with _____
11. The two purines in DNA are
_____.
12. DNA is made of repeating units called

13. Why is RNA necessary to act as a messenger? Why can't the code be taken directly from the DNA?
14. Proteins are made where in the cell?
15. How do some cells become brain cells and others become skin cells, when the DNA in ALL the cells is exactly the same. In other words, if the instructions are exactly the same, how does one cell become a brain cell and another a skin cell?
16. Why is DNA called the "Blueprint of Life"?

Name _____

Color the images according to the instructions.

Messenger RNA



DNA - The Double Helix

